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NOTICES FROM THE LICK OBSERVATORY.*

Prepared by Members of the Staff.

Notes on Some Interesting Double Stars.

Among the many interesting double stars on my observing list, the following seem worthy of special mention at this time. Nearly all of them belong to the class of rapid binaries, though in several instances we lack the data necessary for computing an orbit. All the observations here referred to were made with the 36-inch telescope, using eyepieces with magnifying powers of from 1000 to 2600, except those of 70 *Ophiuchi* and three of the measures of ζ *Herculis* in 1902, which were made with the 12-inch.

Ho. 212 = 13 Ceti.—The mean of three measures in 1902 is:—

1902.63 286°.0 0″.26

and of two recent ones:—

1903.59 306°.2 0″.18

Recalling the fact that Burnham did not see the close pair in 1877 when he measured a faint distant companion, nor in 1890-91 when he examined it with the 36-inch, and noting that the angular motion seems now to be increasing, with diminishing distance, it seems very possible that the revolution period may be about fourteen years. It is now a difficult object to measure even with the 36-inch telescope.

β *612.*—The mean of two nights' measures made last year is:—

1902.32 249°.2 0″.17

and of five measures in the present year:—

1903.39 261°.2 0″.15

From a comparison of these results with earlier measures, it appears that the period is not likely greatly to exceed thirty years, the value found by GLASENAPP in 1892. It will be a difficult pair to measure for several years to come.

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β 949.—This is another star that is now in a critical part of its orbit. When discovered by BURNHAM, in 1880, the distance was 0″.62. In 1898 I found that the distance had diminished to 0″.41. The distance has since diminished very rapidly, with comparatively little change in the angle. The star was examined on three fairly good nights during the present year, but was found too close to measure, the distance being little, if any, over $^{1}/_{10}$″. The plane of the orbit is apparently nearly in the line of sight.

Σ *2084 = ζ Herculis.*—This well-known binary has now become an easy pair, and the motion for some years will be comparatively slow. My measures for the last two years are:—

1902.46	215°.1	0″.92	4^n
1903.34	204 .4	1 .05	2

Σ *2272 = 70 Ophiuchi.*—My measures for the past two years give:—

1902.60	212°.3	1″.59	5^n
1903.54	196 .7	1 .75	3

The point of minimum apparent distance was passed early in 1901, and the distance is now steadily increasing with a corresponding decrease in angular motion.

A. 88.—The rapid angular motion of this pair continues, and the period is likely to be a short one. The mean of three recent measures is:—

1903.44 298°.4 0″.11

The position at the time of discovery was:—

1900.46 353°.2 0″.14

Winlock = ζ Sagittarii.—This interesting binary has now became an exceedingly difficult object for observers in the northern hemisphere, and in the southern hemisphere, unfortunately, there are practically no observers interested in double stars who can command telescopes powerful enough to resolve it. The following are, so far as I know, the only measures made in the past two years:—

1902.55	51°.7	0″.43	1^n	INNES.	(Communicated by letter.)
1902.66	47 .6	0 .36	2	AITKEN.	
1903.40	16 .5	0 .22	2	AITKEN.	

O Σ *535* = δ *Equulei.*—In No. 87 of these *Publications* (p. 198) I gave my measures of this pair to 1902.794. Since then I have measured it as follows:—

1902.873	35°.2	0″.16	
.969	30 .6	0 .18	
1903.46	28 .3	0 .28	5^{n}

The gradual increase in the angular distance which was observed the latter part of last year has evidently continued, and the star is now easily resolved with the 36-inch,—in fact, it is readily recognized as a double star with the 12-inch. Assuming the period of 5.7 years as correct, it will remain a comparatively easy pair for the next two years, and will then close in again.

β *989* = κ *Pegasi.*—Like the preceding pair, κ *Pegasi* will soon reach its greatest apparent separation, and will be well placed for observation for several years. My recent measures give the following results:—

1901.970	209° ±	0″.07 ±	1^{n}
1902.92	171 .8	0 .14	2
1903.52	139 .5	0 .14	4

A. 417 = *83 Aquarii.*—In announcing the discovery of this pair in these *Publications* (No. 86, p. 166) the value of the annual proper motion was erroneously given as 0″.023 in 17°.5. It should be, as Professor Burnham kindly pointed out to me, 0″.107 + in 78°. The same correction applies to *L. O. Bulletin* No. 29 (p. 24). This motion is certainly common to both components, and the system is therefore a physical one. My measures also seem to indicate direct orbital motion, the mean of four recent measures being:—

1903.62	73°.2	0″.20

as compared with:—

1902.64	61°.0	0″.19	4^{n}

β *80.*—This is one of the most interesting stars in Burnham's catalogue, and, at present, a very difficult pair to measure. The distance is rapidly diminishing, and data for an orbit will soon be available. My measures are:—

1901.88	9°.6	0″.32	2^{n}
1903.65	47 .2	0 .20	2

β 733 = 85 Pegasi.—The angular separation in this pair is still great enough to make the little companion easily visible under favorable conditions. Three recent measures give:—

1903.54 262°.0 0″.76

The computed position from BURNHAM's orbit for the same date is: 267°.9, 0″.72.

September 10, 1903. R. G. AITKEN.

PERSONAL SCALE.

Dr. SCHLESINGER's note on this subject in No. 91 of these *Publications* is of interest to all who are engaged in work involving the use of micrometer-screws. For the sake of comparison, I have thought it might be worth while to give here the results of a similar count I have made of the number of times each tenth was recorded in 1,200 recent readings of the micrometers attached to the 36-inch and 12-inch telescopes, together with the results of a similar count of 1,000 earlier readings. As the milled heads of the micrometer-screws are divided into one hundred parts, the tenths of divisions here considered have the value of thousandths of one revolution. The personal scale, therefore, does not affect the accuracy of the micrometer measures. In the following table all of the percentages would be 10.0 if there were no personal scale.

Tenths.	1200	1000
.0	20.2	20.3
.1	8.2	8.9
.2	16.7	15.7
.3	8.0	8.4
.4	6.8	7.8
.5	9.2	11.0
.6	5.9	6.7
.7	5.3	3.0
.8	15.3	14.6
.9	4.4	3.6

It is apparent that the two counts give practically the same error-curve, and show that while 0.5 was read as often as it occurred, 0.1, and especially 0.9, were slighted in favor of 0.0; and 0.3, 0.4, and 0.6, 0.7 in favor of 0.2 and 0.8 respectively.

September 8, 1903. R. G. AITKEN.